

## **Muscle Mitochondrial Function at Different Phases of the Menstrual Cycle**

BRANDON PFEIFER, BRIELL KING, ERIN ATKINSON, CHAD R HANCOCK, ROBERT D. HYLDAHL

Hyldahl Research Lab; Exercise Science; Brigham Young University; Provo, UT

---

*Category: Undergraduate*

*Advisor / Mentor: Hyldahl, Robert (robhyldahl@byu.edu)*

### **ABSTRACT**

The effect of menstrual cycle (MC) phase on muscle recovery from damage has been studied using markers of strength and soreness, but remains inconclusive. Mitochondrial function is essential for muscle recovery, and has been found to be influenced by estradiol (E2). Understanding the relationship between MC phase and mitochondria can provide further insight into women's muscle health. The PURPOSE of this study was to determine how MC phase affects markers of muscle damage and recovery, with emphasis on mitochondrial function, following electrically-stimulated muscle contractions. METHODS: 22 premenopausal females were recruited and split into two groups, early follicular (EF) and late follicular (LF). After menstrual cycle tracking and phase confirmation, subjects performed a baseline maximum voluntary knee extension contraction (MVC) and provided a muscle biopsy one week prior to test day. On test day, subjects underwent 200 electrically stimulated eccentric muscle contractions (ES). Subjects reported for follow-up strength tests on days 2, 4, and 7 post damage, and gave a final biopsy on day 7. RESULTS: MVC decreased an average of  $14 \pm 6\%$  immediately following ES and recovered to  $6 \pm 7\%$  below baseline by day 4, with no differences between groups for percent decrease in MVC ( $p=.67$ ). Average peak soreness was  $4.0 \pm 1.9$ , with no differences between groups ( $p=.91$ ). Average change in max coupled mitochondrial respiration was  $-14.3 \pm 15.5 \text{ pmolO}_2\text{-s}^{-1}\cdot\text{mg}^{-1}$  for the EF group and  $1.3 \pm 22.3 \text{ pmolO}_2\text{-s}^{-1}\cdot\text{mg}^{-1}$  for the LF group ( $p=.03$ ). Average change in fatty acid supported respiration was  $-3.6 \pm 7.4 \text{ pmolO}_2\text{-s}^{-1}\cdot\text{mg}^{-1}$  for the EF group and  $7.5 \pm 10.5 \text{ pmolO}_2\text{-s}^{-1}\cdot\text{mg}^{-1}$  for the LF group ( $p=.046$ ). However, these results are complicated by baseline differences in respiration, with max coupled respiration being significantly higher ( $p=.02$ ) in the mid-luteal phase (EF group baseline) than the early-follicular phase (LF group baseline). CONCLUSIONS: Results show novel findings that baseline mitochondrial respiration and mitochondrial response to damage differ between MC phases. This finding supports previous research relating mitochondrial function and E2 levels, and suggests further research on mitochondrial function throughout the menstrual cycle.